MIXED ROOSTING ASSOCIATES OF INDIAN MYNA ACRIDOTHERES TRISTIS IN PUNE CITY, INDIA

ANIL MAHABAL[1] AND D.B. BASTAWDE[2]

1. *Zoological Survey of India, High Altitude Zoology Field Station, SOLAN - 173 212 (H.P.), India*

2. *Zoological Survey of India, Arunachal Pradesh Field station, ITANAGAR - 791 111, India*

Different species of birds assemble together to form diurnal or nocturnal mixed feeding flocks, breeding colonies and communal roosts (Zahavi, 1971; Gadgil, 1972; Ward and Zahavi, 1973; Gadgil and Ali, 1975). The significance of bird assemblages has been discussed in detail by Gadgil and Ali (1975). The Indian Myna is a familiar urbanized bird. They are gregarious and roost communally at nights in groups of hundred to several hundreds alongwith other species of birds throughout the year. The present paper deals with observations on the mixed roosting associates of Indian Myna, *Acridotheres tristis* (Linnaeus), (Sturnidae : Passeriformes), at their various roosts in Pune, Maharashtra.

STUDY AREA AND METHODS

Nineteen communal roosts of Indian Mynas were located in Pune city (18° 30' N and 73° 53' E). They were designated as R-I to R-XIX for convenience of recording observations (Fig. 1). The bird associating with Indian Mynas were recorded at each mixed roost during June 1973 to August 1976. Further, all the associating birds were counted at monthly intervals from September 1974 to August 1976 in the evening. This was faciliated due to the differences in the time of their arrival at the roost, their speed and mode of flying.

OBSERVATIONS

Out of 19 communal roosts of Indian Mynas under observations, mixed roosting was observed at its 12 permanent roosts (Fig. 1) which were recorded throughout the period of study. The remaining 7 roosts were found to be temporary and these included exclusively Indian Myna.

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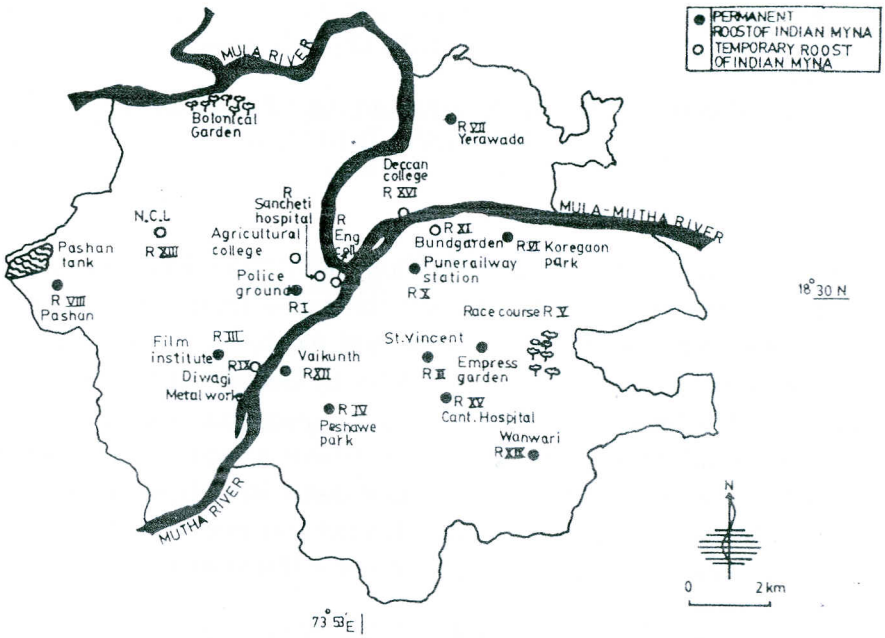

Fig. 1 : Map of Pune City showing the location of communal roosts of Indian Myna.

Mixed roosting associates :

A study of the roostwise distribution of associating bird species, their status and feeding habits (Table 1) indicates :

a) Thirty species of birds were found to be associated with Indian Mynas at its various roosts. Out of these, 13 were found to be communal roosters whereas remaining were non-communal ones.

b) The communally roosting birds such as House-and Jungle Crow were observed at all 12 roosts of Indian Mynas while others such as Pariah Kite, Brahminy Myna, Rosy Pastor and House Sparrow accompanied Indian Mynas at 8 to 9 mixed roosts.

c) The mixed association of communally roosting birds such as Pariah kite, Roseringed Parakeet, Brahminy Myna, Jungle Myna, House-and Jungle Crows, Redvented Bulbul and House Sparrow with Indian Myna was found to be throughout the year. Pond Heron, Cattle Egret and Little Egret were

TABLE 1

Mixed Roosting Companions of Indian Myna

Sr. No.	Species Name	Common Name	Status	Food habit	Communal roost of Indian Myna R-I	R-II	R-III	R-IV	R-V	R-VI	R-VII	R-VIII	R-X	R-XII	R-XV	R-XIX
	Communal rooster:															
	ORD : CICONIIFORMES															
	FAM : ARDEIDAE															
1.	Sp. *Ardola grayii* (Sykes)	Pond Heron	R/LM	I-A	-	-	-	P	-	P	-	P	-	P	-	-
2.	Sp. *Bubulcus ibis* (Linnaeus)	Cattle Egret	R/LM	I-A	-	-	-	-	P	P	P	P	-	P	-	-
3.	Sp. *Egretta garzetta* (Linnaeus)	Little Egret	R/LM	I-A	-	-	-	-	-	P	-	-	-	P	-	-
	ORD : FALCONIFORMES															
	FAM : ACCIPITRIDAE															
4.	Sp. *Milvus migrans* (Boddaert)	Pariah Kite	R	C	-	P	-	P	P	P	P	-	-	P	P	P
	ORD : PSITTACIFORMES															
	FAM : PSITTACIDAE															
5.	Sp. *Psittacula krameri* (Scopoli)	Roseringed Parakeet	R	F	-	P	-	-	-	P	-	-	-	-	-	-
	ORD : CORACIIFORMES															
	FAM : MEROPIDAE															
6.	Sp. *Merops orientalis* Latham	Small Green Bee-eater	R	I	-	-	P	P	P	P	P	P	-	-	-	-
	ORD : PASSERIFORMES															
	FAM : STURNIDAE															
7.	Sp. *Sturnus pagodarum* (Gmelin)	Brahminy Myna	R	O	P	-	P	-	P	P	P	P	-	P	-	P
8.	Sp. *Sturnus roseus* (Linnaeus)	Rosy Pastor	WM	O	P	P	P	P	P	P	P	P	-	P	-	-
9.	Sp. *Acridotheres fuscus* (Wagler)	Jungle Myna	R	O	-	-	-	-	-	-	-	-	-	P	-	-

10.	Sp. *Corvus Splendens(Vieillot)*	House Crow	R	O	P	P	P	P	P	P	P	P	P	P	P	P
11.	Sp. *Corvus macrorhynchos* Wagler FAM : PYCNONOTIDAE	Jungle Crow	R	O	P	P	P	P	P	P	P	P	P	P	P	P
12.	Sp. *Pycnonotus cafer* (Linnaeus) FAM : PLOCEIDAE SUB-FAM : PASSERINAE	Redvented Bulbul	R	F	-	-	-	P	-	-	-	P	-	P	-	-
13.	Sp. *Passer domesticus* (Linnaeus) *Non-Communal rooster:* ORD : GRUIFORMES FAM : RALLIDAE	House Sparrow	R	O	P	P	P	P	P	P	P	-	-	P	P	-
14.	Sp. *Amaurornis phoenicurus* (Pennant) ORD : CHARADRIIFORMES FAM : CHARADRIIDAE SUB-FAM : CHARADRIINAE	Whitebreast-ed Waterhen	R	I-V	-	-	-	-	-	-	-	-	-	P	-	-
15.	Sp. *Vanellus indicus* (Boddaert) ORD : COLUMBIFORMES FAM : COLUMBIDAE	Redwattled Lapwing	R	I	-	-	P	P	P	P	P	P	-	P	-	-
16.	Sp. *Streptopelia decaocta* Frivaldszky ORD : CUCULIFORMES FAM : CUCULIDAE	Ring Dove	R	G	-	-	P	-	-	-	-	P	-	-	-	-
17.	Sp. *Eudynamys scolopacea* (Linnaeus)	Indian Koel	R	F	-	P	P	P	P	P	P	P	-	P	-	-
18.	Sp. *Centropus sinensis* (Stephens) ORD : CORACIIFORMES FAM : ALCEDINIDAE	Crow Pheasant	R	O	-	-	-	P	-	-	-	-	-	-	-	-
19.	Sp. *Alcedo atthis* (Linnaeus)	Small Blue Kingfisher	R	I-A	-	-	-	P	-	-	-	P	-	P	-	-
20.	Sp. *Halcyon smyrnensis* (Linnaeus) FAM : UPUPIDAE	Whitebrea-sted Kingfisher	R	I-A	-	-	-	P	-	P	-	-	-	P	-	-

21.	Sp. *Upupa epos* Linnaeus Fam : BUCEROTIDAE	Ceylon Hoopoe	WM	I	P	-	P	P	P	-	P	P	-	-	-	-
22.	Sp. *Tokus virostris* (Scopoli) ORD : PICIFORMES FAM : CAPITONIDAE	Grey Hornbill	R	F-I	P	-	-	-	-	P	-	P	-	P	-	-
23.	Sp. *Megalaima viridis* (Boddaert) ORD : PASSERIFORMES FAM : ORIOLIDAE	Small Green Barbet	R	F	-	-	-	P	-	P	P	-	-	P	-	-
24.	Sp. *Oriolus oriolus* (Linnaeus) FAM : DICRURIDAE	Golden Oriole	R/LM	F	-	-	-	-	-	P	-	-	-	P	-	-
25.	Sp. *Dicrurus adsimilis* (Bechstein) FAM : PYCNONOTIDAE	Black Drongo	R	I	-	-	-	P	P	P	P	P	-	-	-	-
26.	Sp. *Pycnonotus jocosus* (Linnaeus) FAM : MUSCICAPIDAE SUB-FAM : TIMALIINAE	Redwhis-kered Bulbul	R	F	-	-	-	-	-	-	-	P	-	-	-	-
27.	Sp. *Turdoides striatus* (Dumont) SUB-FAM : TURDINAE	Jungle Babbler	R	O	-	-	-	-	-	P	P	P	-	-	-	-
28.	Sp. *Saxicoloides fulicata* (Linnaeus) FAM : MOTACILLIDAE	Indian Robin	R	I	-	-	P	P	-	-	-	P	-	-	-	-
29.	Sp. *Motacilla maderaspatensis* Gmelin FAM : EMBERIZIDAE	Large Pied Wagtail	R	I	-	-	P	P	P	P	P	P	-	P	-	-
30.	Sp. *Emberiza bruniceps* Brandt	Redheaded Bunting	WM	G	-	-	-	-	-	P	-	P	-	P	-	-
	Total No. of species at the roost :				**7**	**7**	**12**	**18**	**13**	**21**	**15**	**20**	**2**	**21**	**4**	**4**

Status : R = Resident, LM = Local Migratory, WM = Winter Migrant; P = Present.

Food habits : A = Amphibian eaters, C = Carnivorous, F = Frugivorous, G = Graminivorous, I = Insectivorous, O = Omnivorous V = Vegetable matter.

TABLE 2

POPULATION OF MIXED ROOSTING COMPANIONS AT DIFFERENT ROOSTS DURING 1975-1976
(IN RELATIVE PERCENTAGE)

Roost	Name of the Bird													
	Pond Heron	Cattle Egret	Little Egret	Pariah Kite	Roseringed Parakeet	Green Bee-eater	Brahminy Myna	Rosy Pastor	Jungle Myna	Indian Myna	House & Jungle Crow	Redvented Bulbul	House Sparrow	All non-communal Roosters
R-I	-	-	-	-	-	-	0.4	1.4	-	62.6	30.0	-	5.3	0.3
R-II	-	-	-	2.8	13.0	-	0.1	-	-	47.4	29.1	-	7.4	0.2
R-III	-	-	-	-	-	1.3	1.5	0.5	-	50.3	38.6	-	7.3	0.5
R-IV	0.3	-	-	1.0	-	-	-	-	-	24.3	67.4	0.2	6.5	0.3
R-V	-	1.4	-	1.4	-	4.1	6.7	-	-	37.2	32.6	-	15.0	1.6
R-VI	0.2	0.06	-	0.05	68.7	0.5	0.9	0.03	-	26.7	0.06	-	2.3	0.5
R-VII	-	2.7	-	1.5	-	0.6	0.4	-	-	17.0	76.0	-	1.6	0.2
R-VIII	6.5	1.9	0.2	1.4	-	11.8	13.8	-	-	53.8	2.8	0.8	-	7.0
R-X	-	-	-	-	-	-	-	-	-	56.0	44.0	-	-	-
R-XII	5.3	6.3	0.2	1.5	-	0.7	1.6	0.1	0.8	31.4	42.6	0.6	8.2	0.7
R-XV	-	-	-	-	-	-	-	-	-	49.2	21.7	-	28.8	0.3
R-XIX	-	-	-	7.6	-	-	1.5	-	-	36.0	54.0	-	-	0.9
Mean :	1.03	1.03	0.03	1.44	6.81	1.58	2.24	0.17	0.07	40.99	36.57	0.13	6.87	1.04=100

associated with Indian Mynas during their non-breeding season (since these birds show local migration out of Pune city during their breeding season from June to September). Mixed association of Rosy Pastor (a winter migratory bird) with Indian Myna was found to be only during October to March.

d) The non-communal roosters (staying solitarily, in pairs or in small parties) such as Redwattled Lapwing, Pied Wagtail and Indian Koel accompanied Indian Mynas at 7 to 8 mixed roosts. Mixed association of all the non-communal roosters with Indian Mynas was noticed to be seasonal.

e) The highest number of bird species roosting with Indian Mynas was found at mixed roosts R-VI, R-XII and R-VIII which are very close to river or lakeside (Fig. 1). At roost R-X only House-and Jungle Crows accompanied Indian Mynas.

f) Out of 30 species roosting alongwith Indian Mynas, 23 were noticed to be resident bird species, 4 resident but temporarily local migrating and the remaining 3 were non-residents (winter migrants).

g) The birds species roosting with Indian Mynas show diversity in their food habits. Out of 30 birds species, 8 species were found to be omnivorous, 6 frugivorous, 6 insectivorous, 1 carnivorous, 2 graminivorous and the remaining 7 feeding on fruits, insects, amphibians, vegetable matters etc.

Besides the above mentioned perennial mixed roosts, a short - term association of Indian Mynas was observed with Indian Whitebacked Vulture *Gyps bengalensis* (Gmelin) near Pune (Mahabal, 1977). The other companions at this mixed roost were Whitenecked Stork *Ciconia episcopus* (Boddaert) and House-and Jungle Crows.

Population at mixed roosts :

Table 2 depicts the percentage composition and mean annual population of each communally roosting bird species and non-communal roosters at different mixed roosts during the year 1975-76.

a) Among the communally roosting birds, Indian Myna and Rosy Pastor show

highest population at R-I; House-and Jungle Crows at R-VII; House Sparrow at R-XV; Pariah kite at R-XIX; Roseringed Parakeet at R-VI; Cattle Egret at R-XII whereas Pond Heron, Brahminy Myna, Green Bee-eater and non-communal roosters at R-VIII as compared to their population at other mixed roosts.

b) At mixed roosts, R-I, R-III, R-VIII and R-X more than 50% of the population was composed of Indian Myna, whereas at R-IV, R-VII and R-XIX more than 54% of the population was that of House-and Jungle Crows. At R-VI more than 68% birds were Roseringed Parakeet.

c) The mean yearly population of India Myna was the highest among the mixed roosting birds during 1975-76 followed by House-and Jungle Crows, House Sparrows and Roseringed Parakeets. During the year 1974-75 the mean yearly population composition of each of the mixed roosting bird species was found to be more or less similar.

Behavior at mixed roosts :

After arrival of birds of various species at the mixed roost, they started making a noise which increased steadily as more and more birds joined the roost. It reached the peak when most of the birds had arrived. Thereafter, the noise gradually decreased and stopped completely when it was dark.

The principal noise makers at the mixed roosts were House-and Jungle Crows, Indian Myna and Roseringed Parakeet. House Sparrow, Rosy Pastor and Brahminy Myna made moderate and soft noise. Sometime, Pond Heron uttered a peculiar "Khyaa-Khyaa--" noise. Pariah Kite, Cattle-and Little Egrets did not make any noise. The bird species which did not make any noise settled quickly at the roost without much inter-and intraspecific interactions. House Sparrow, Rosy Pastor and Brahminy Myna took little more time for final settlement. However, House-and Jungle Crows, Indian Myna and Roseringed Parakeet showed maximum intraspecific interactions and took longer time for final settlement.

DISCUSSION

Various workers have putforth different hypotheses regarding functions of communal and mixed roosts. The most notable being that communal roosts serve as information centers for location of food sources (Ward and Zahavi, 1973) and

antipredatory function (Zahavi, 1971; Sengupta, 1973; Counsilman, 1974 and Gadgil and Ali, 1975).

The present studies show that the birds of divergent food habits assemble together and form mixed roosts. The association of carnivorous kites with strictly furgivourous parakeets or insectivorous and amphibian eater heron and egrets, do not support the above hypothesis of exchange of food information. It is possible that communication of information regarding location of food sources may be functioning at the level of intra-specific but not at inter-specific level.

It is highly probable that predator avoidance is the function of communal roosting in those species that associate with other species in forming mixed roosts (Gadgil, 1972). Khera and Kalsi (1986) have also pointed out that the Bank Myna, *Acridotheres ginginianus* and associated species at mixed roosts respond readily to each other's alarm call, which is an efficient antipredator mechanism. Likewise the Indian Myna and its mixed roosting associates have developed a system of anti-predatory warning signals. The bird species roosting in small numbers (mainly non-communal roosters) may also be getting this advantage of predator avoidance by mixed roosting with the communal roosters.

SUMMARY

Various bird species associating with Indian Mynas, *Acridotheres tristis*, were studied at its all the mixed roosts in Pune city (India) from June 1973 to August 1976. Thirty species of birds having divergent food habits were observed to be associating with Indian Myna either seasonally or throughout the year. Of these, 13 were found to be communal roosters whereas the remaining were non-communal roosters. The percentage composition of each bird species at mixed roost and probable functions of mixed communal roosts have been discussed.

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